REMARKS

The applicant acknowledges with appreciation the telephone interview of March 26, 2003.

The interview discussed proposed amendments to the Description and the Claims in order to improve grammatical expression. The proposed amendments to the Description and Claims are presented herewith.

Claims 4, 5, 6, 7 and 16 to 26 are presently pending. The Examiner advised that claims 4, 5, 6, 7 and 16 to 21 are allowable; that the patentability of claim 22 might be reconsidered over prior art identified in a new search; and that claims 23 to 26 are objected to but would be allowable is presented in independent form.

During the interview the applicant requested an identification of the prior art found in the new search. The Examiner identified the prior art as McCarthy et al, U.S. Patents 5,602,447; Kubokawa et al, U.S. Patent No. 4,960,106; Kubokawa et al., U.S. Patent No. 5,035,231;Yamasaki et al., U.S. Patent No. 5,497,776; Kuster, U.S. Patent No. 4,859,948; Foster et al., U.S. Patent No. 5,337,845; Foster et al., U.S. Patent No. 5,457,831; and Foster et al., U.S. Patent No. 5,335,651. The Examiner did not indicate with particularity the basis under 35 USC 102 or 103 for the application of the new prior art to claim 22. The applicant noted that under 37 CFR 104 that in the rejection of a claim the Examiner is obliged to rely on the best references. Multiple rejections of any over different references are an objectionable practice.

The Examiner is requested to make the above US patents of record in this application.

The applicant has reviewed the US patents cited in the new search and has concluded that claim 22 as presently submitted is novel and patentable.

McCarthy et al. discloses a method and apparatus for determining changes in the enthalpy of an object undergoing a freezing cycle using magnetic resonance imaging techniques. Kubokawa et al. '231 and '106 teach the use of an endoscope with magnetic resonance imaging. The endoscope is applied internally to the subject and may have non-metallic or non-magnetic features to avoid interference with the magnetic resonance system or signal. Yamasaki et al. discloses an apparatus for displaying an ultrasonic three-dimensional image of a living body; a diagnostic imaging modality having features not related to magnetic resonance imaging. Foster et al. '651 and '845 and '831 disclose a hospital bed in combination with a patient ventilator and other support equipment for the purpose of transporting the patient to other services, including diagnostic or imaging. Kuster teaches using compressed air to transport a sample in a NMR spectrometer to provide access and removal of the sample.

None of the newly cited prior art, either alone or in any expected teaching combination, discloses providing means for providing a flow of air into a space in which a subject is positioned where the means is made from a non-magnetic or non-metallic material nor is there any teaching of means for adjusting the position of the subject in the magnet system.

DESCRIPTION AMENDMENTS

Paragraphs [0002], [0016], [0056], [0057], [0059], [0074] and [0079] as amended:

[0002] In a magnetic resonance imaging device, the subject for imaging is positioned into an inner space of the magnet system, or in other words into an image capture space formed of a static magnetic field. A gradient magnetic field and a high frequency magnetic field are applied to generate a magnetic resonance signal within the imaging subject, and a cross sectional image is generated (reconstructed) based on that received signal.

[0016] Therefore, the embodiments of the invention provide a highly efficient air feed device, as well as means for signal acquisition and a means for imaging comprising the means for air feed.

[0056] The rotation of the water wheel is conveyed to the rotating vanes 71 by way of the gear box 73. The gears within the gear box 73 can be shifted to allow adjustment of the rotational speed of the rotating vanes 71. An internal clutch is provided for turning the gears on and off allows intermittent conveyance of the motive force from the fluid motor 75 to the rotating vanes 71.

[0057] The control unit 161 controls the shifting of gears and turning of a clutch on and off. Needless to say, this control may be performed manually. The gear box 73 may be omitted when there is no need to adjust the rotational speed of the rotating vanes 71.

[0059] The fluid motor 75, that comprises a means for air flow, uses no electricity and no magnetic signals are generated which may interfere with the magnetic resonance signal.. Also, the gear box 73, the fluid motor 75 and the rotating vanes 71 are each made of a nonmetallic and nonmagnetic material such as plastic or ceramics so that the operation of these components does not disturb the electrical environment of the magnet system 11.

[0074] After spin inversion, the spin is rephased by the readout gradient Gr, and the spin echo MR is generated. The spin echo MR is an RF signal having a waveform symmetrical to the center echo. The center echo occurs at a point in time after TE (echo time) from the 90 degree excitation. The spin echo MR is collected as view data by the data acquisition unit 151. A pulse sequence of this kind is repeated 64 to 512 times at the periodic TR (repetition time). The phase encode gradient Gp is changed each time the pulse sequence is repeated, and different phase encoding is performed each time. View data for views 64 to 512 are acquired in this way.

[0079] The gradient echo MR is collected as view data by the data acquisition unit 151. A pulse sequence of this kind is repeated 64 to 512 times at a period TR (repetition time). The phase encode gradient Gp is changed each time the pulse sequence is repeated, and different phase encoding is performed each time. View data for views 64 to 512 are obtained in this way.

CLAIM AMENDMENTS

Copy of claims 4 and 22 as amended:

4. A magnetic resonance imaging device comprising:

means for signal acquisition that acquires a magnetic resonance signal;

a space accommodating a subject for imaging;

a fluid motor rotating by fluid flow and disposed adjacent to the space; and

rotating vanes driven by the fluid motor that forces air into the space, wherein the fluid motor and the rotating vanes do not cause electrical interference with the device.

22. A magnetic resonance imaging system comprising:

a magnet system having a space for positioning a subject therein;

means for acquiring a magnetic resonance signal;

means for providing a flow of air into the space, the means being made from a non-magnetic or non-metallic material that avoids interference with the magnet system or the means for acquiring a magnetic resonance signal; and

means for adjusting the position of the subject in the magnet system.

DESCRIPTION AMENDMENTS INDICATING AMENDMENT

Paragraphs [0002], [0016], [0056], [0057], [0059], [0074] and [0079] indicating the amendment:

[0002] In a magnetic resonance imaging device, the subject for imaging is positioned into an inner space of the magnet system, or in other words into an image capture space formed of a static magnetic field [, A] . A gradient magnetic field and a high frequency magnetic field are applied to generate a magnetic resonance signal within the imaging subject, and a cross sectional image is generated (reconstructed) based on that received signal.

[0016] Therefore, the embodiments of the invention provide [provides] a highly efficient air feed device, as well as a means for signal acquisition and a means for imaging comprising the means for air feed.

[0056] The rotation of the water wheel is conveyed to the rotating vanes 71 by way of the gear box 73. The gears within the gear box 73 can be shifted to allow [adjusting] adjustment of the rotational speed of the rotating vanes 71. An [Providing an] internal clutch is provided for turning the gears on and off allows [intermittently] intermittent [conveying] conveyance of the motive force from the fluid motor 75 to the rotating vanes 71.

[0057] The control unit 161 [is control] controls the shifting of gears and turning of a clutch on and off. Needless to say, this control may be performed manually. The gear box 73 may be omitted when there is no need to adjust the rotational speed of the rotating vanes 71.

[0059] [In means for air feed the] The fluid motor 75, that comprises a means for air flow, uses no electricity [,] and no magnetic signals are generated which may interfere with the magnetic resonance signal [might not occur] . Also, the gear box 73, the fluid motor 75 and the rotating vanes 71 are each made of a nonmetallic and nonmagnetic material such as plastic or ceramics so that the operation of these components does not disturb the electrical environment of the magnet system 11.

[0074] After spin inversion, the spin is rephased by the readout gradient Gr, and the spin echo MR is generated. The spin echo MR is an RF signal having a waveform symmetrical to the center echo. The center echo occurs at a point in time after TE (echo time) from the 90 degree excitation. The spin echo MR is collected as view data by the data acquisition unit 151. A pulse sequence of this kind is repeated 64 to 512 times at the periodic TR (repetition time). The phase encode gradient [GP] Gp is changed each time the pulse sequence is repeated, and different phase encoding is performed each time. View data for views 64 to 512 are acquired in this way.

[0079] The gradient echo MR is collected as view data by the data acquisition unit 151. A pulse sequence of this kind is repeated 64 to 512 times at a period TR (repetition time). The phase encode gradient [GP] Gp is changed each time the pulse sequence is repeated, and different phase encoding is performed each time. View data for views 64 to 512 are obtained in this way.

CLAIM AMENDMENTS INDICATING THE AMENDMENT

Copy of claims 4 and 22 indicating the amendment:

4. A magnetic resonance imaging device comprising:

means for signal acquisition that acquires a magnetic resonance signal;

a space accommodating a subject for imaging;

a fluid motor rotating by fluid flow and disposed adjacent to the space; and

rotating vanes driven by the fluid motor [and forcing] that forces air into the space, wherein the fluid motor and the rotating vanes do not cause electrical interference with the device.

22. A magnetic resonance imaging system comprising:

a magnet system having a space for positioning a subject therein;

means for acquiring a magnetic resonance signal;

means for providing a flow of air into the space, the means being made from a non-magnetic or non-metallic material that avoids interference with the magnet system or the means for acquiring a magnetic resonance signal; and

means for adjusting the position of the subject in the magnet system.